

# Demystifying vernacular shop houses and contemporary shop houses in Malaysia; A Green-Shop Framework

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## ABSTRACT

*Vernacular shop houses in Malaysia have been thoroughly studied to understand their significance in environmental, cultural, economical and heritage values. UNESCO recognition in 2008 has further secured shop houses conservation works in Malaysia (UNESCO, 2008). However, contemporary shops in Malaysia do not share similar concerns of preservation and cultural significance. Popular view has perceived contemporary shop as lacking of both cultural and building performances standards. Thus, this research testifies the cultural and building performances in both contemporary shops and vernacular shop houses through cross-content analysis onto Malaysia Uniform Building By-law (UBBL), Green Building Index (GBI) and Special Area Plan (SAP). This research aims to critically investigate the correlation between vernacular and contemporary shop houses to develop a guideline strategy for green performance in shop houses. Through re-learning of vernacular shop house design and critical examination of governing policies, this research had highlighted some design issues that affects today practices. Policies are exploited to users' interpretation that contributes to poorly built shop houses that have neither green nor cultural significance. This framework developed three distinct yet complementary areas in a bid to explore various green strategies and important criteria, which are building envelope design, green design, and cultural design to identify the correlation between green performances and cultural sensitive buildings. Hence, this research provides fundamental guides to portray future potential of high performance shop architecture in Malaysia.*

## 1. INTRODUCTION

Vernacular shop house (Malay: rumah kedai) is one of the unique architecture found in South East Asia particularly in Malaysia and Singapore built from 17<sup>th</sup> to early 20<sup>th</sup> century (Chen, 2007; Wan Ismail, 2005). The unique Chinese form of shop houses resulted from local influences and colonial's modification in an attempt to adapt to tropical climates. Vernacular shop houses follow Chinese rules of thumb in architecture which are symmetrical (Hong, 2009), narrow layout, and air-well in between spaces (Wan Ismail, 2005). Contemporary description has defined a vernacular shop house as 'built single, double or triple storey building' (Mohd. Baroldin & Mohd. Din, 2012) with measures of 6 to 7 meter width and depth of 30 meters and it could extend up to 60 meters (Haromshah, 2009). However, these attached buildings are not built simultaneously but over the time, adjoined together (UM-NUS Joint Studio Programme, 2009). Singapore Governor Sir Raffles altered the Chinese shop house's structure in 1822 by imposing five-foot ways (a covered pedestrian arcade) to accommodate wet weather in the region (Wan Ismail, 2005, p. 28; Abdul Mohit & Sulaiman, 2006). Furthermore, in late 19<sup>th</sup> century, backlanes for shop houses were required to allow accesses for sanitary and fire preventive measures, yet, had been reduced to limited use of rubbish collection in contemporary practice. Nonetheless, these changes have contributed to today unique shop houses physical forms. However, there are no evidences of continuous improvement to shop physical structure to adapt to present needs since mid of the 20<sup>th</sup> century. Hence, shop houses should revamp their present conventional structure to enhance the building performance toward greener design in a parallel response to sustainable development.

## 1.1. Shop houses development to present

Conservative organisations such as Georgetown World Heritage Inc. (GTWHI) and Badan Warisan have recognised heritage importance of shop houses that are dated back to before early 20<sup>th</sup> century (Figure 1). Mass developed shop houses after 1960's are perceived as non-cultural importance (Figure 2) and categorised as contemporary shop houses. Since the 17<sup>th</sup> century, shop houses went into a series of evolution that represented the Chinese and hybrid cultural influence. The evolution or transitional changes are part of the process of adaptation of climates, local cultural, economic demands and fashion influence. Shop houses were popular urban fabric during the 19<sup>th</sup> century to the early of the 20<sup>th</sup> century because of socio-economical advantages (Chen, 2007, pp. 90-91).



**Figure 1: Timeline depicts shop houses facade transition is influenced by socio-cultural and political changes. The facades show different materials used ranging from timber to concrete through the global technology advancement**

The stylistic of shop houses have hybrid characteristic incorporating architectural vocabulary from the West, Chinese and Malay. However, the adaptation to the Western design was only popular after local exposure to the culture in late 19<sup>th</sup> century. Revival styles such as Neo-classical and Palladian in the 1920's and 1930's (Pile, 2009, p. 432) prompted this fusion design. The revival styles are more acceptable than modernism, although both were popular during the early 20<sup>th</sup> century. Hence, the built form fashion could be integrated into local identity (Abel, 2000) are of trans-cultural significance (Presas, 2005). Regrettably, shop houses that adapted modernism later in the 1960's have not been classified as of historical significance because it lacks these unique characteristics of earlier shop houses and were continuously diluted by mass development. Moreover, contemporary shop houses are scarcely retained in original forms because of heavy modifications that resulted in difficulty to identify transitional forms in present architecture. The continuous modification of buildings structure is evidence of contemporary poor understanding of users' needs.



**Figure 2: Classification of contemporary shop houses based on authors' research and observation**

## 1.2. Shop houses as everyday architecture

Shop houses are simple buildings that do not stand as landmark or are of structural significant in urban definition. Their contemporary development and contribution to urban coherence and socio-cultural is poorly understood. Mass development is controlling the number of shop houses development in today urban fabric. However, studies found that this typology of everyday architecture is highly significant towards cultural development in heritage towns (Davis, 2006). Hence, contemporary shop houses would leave their marks onto Malaysian architecture and urban context that critically shaped the future of regional development.

In contrast, the formations of vernacular shop houses have encapsulated everyday life and place identity (AJM Planning and Urban Design Group , 2011). The unique shop houses structures have remarkably shaped earlier part of many cities with Chinese settlements (Chen, 1993) in Malaysia. Collectivity (Terraced shop houses) of "individual" shop houses with distinctive embellishment has enhanced the language shared within the urban taxonomy. Shop houses constructed forming several rows have increased their significance as a cluster of buildings that shapes local community life. These buildings could not function as singular entity; despite of their building performances (Davis, 2006, pp. 236-237). Therefore, contemporary shop houses should be critically re-examined to ensure the significance of shop houses continuously upheld as unique everyday architecture in Malaysia.

## 2. Evolution of Shop Houses in Malaysia

Contemporary shops in Malaysia are evolved from shop houses that dominated the urban landscape in the 19<sup>th</sup> and early 20<sup>th</sup> century. These retail buildings are significant in shaping local socio-economic aspects and formed parts of contemporary urban fabrics. The continuous development of new neighbourhoods or towns would observe shop houses as part of the common fabric for general small commercial activities in townscape and neighbourhood development (Maleki, et al., 2012).

Policies restriction and socio-cultural acceptance play roles in how shop houses perform to fulfil community needs. The notion of shop houses being green architecture is not bound within the set of physical structure but is correlated within policies and regulation and their impact on socio-cultural aspects. Encouragement and support from authorities are needed to promote greater energy efficiency and sustainable building among public users (Yang, et al., 2014).

### **2.1. Locality and Regionalism in Architecture**

Shop house evolution lies within the acceptability of local towards foreign culture. The emphasis on foreign culture acceptability and adaptability to local identity is important to understand socio-cultural value in building performances. The relationship between architecture and its surrounding is simply an understanding of a place by oneself to create local identity (Abel, 2000, p. 143). Thus, architecture is the tangible resource of place identity that is influenced by socio-cultural aspects. The context of place identity is not only encased within socio-cultural aspect but as a holistic understanding of the place including climatic and topographic issues (Perera, 2013). Lee et al (2013, p. 604) identified place identity as reflection of local activities and its physical environment. The cultural importance, however, is only shown onto relevance and appropriation of “correct” culture that will enhance functionality and provides sense of orientation (Pelletier, 2012). However, in present shop house environment, buildings and its space has foregone the regional identity with globalised and homogenised image (Abel, 2000, p. 190). Kaye (1991 , p. 31) described the dilapidating of local shop houses as “hollow out of tradition”, emphasising the idea of empty shop houses’ façade.

Hence, regional orientated contemporary shop houses could transform the building into contextually appropriate, instructive and encouraging as locally unique and functioning architecture (Too, 1990). Lewis Mumford summarised that regionalism is not preserving the past or imitating but to recreate the same cultural value that are encapsulated in vernacular architecture onto new buildings that represent contemporary community (Lefavre & Tzonis, 2001). Thus, the notion of regionalism in Malaysia is to celebrate the local identity (Day, 2004, p. 238) and localise the modernity development in the country. Regional designated shop houses should be climatically responsive to enhance building performances (Ozkan, 2006, p. 108). Hybrid designed vernacular shop houses are learning examples of adapting foreign architecture to form local community identity (Abel, 2000) for contemporary practices. These shop houses will continue to readapt the changing norms of the society and practices. Hence, successful contemporary shop houses could adapt foreign elements to enhance aesthetic, functionality and building performances without sacrificing local identity.

Concomitantly, the notion of modernisation would contribute into greater understanding of social problems that could be addressed with modern knowledge. Technology advancement and greater standardisation system could be beneficial towards improved design with enhanced understanding of material properties, construction methods and users behaviour.

### **2.2. Shop Houses and Urban Space**

In view of a good urban environment is a precondition for a good quality of life, the quality of that area (urban) is a reflection from buildings and minor developments within the boundary. These physical developments besides being functional should incorporate cultural identity, green initiative and efficiency. Mass developed standardised contemporary shop houses have disrupted the urban patterns (Said, et al., 2013) with monotonous façades they have intimidated other surrounding buildings. The destruction of community identity is in-search for new “signature” and enforces this synthetic image to represent the local identity (Kaye, 1991 ).

Shop houses have encompassed other urban functionality in Malaysia including socio-cultural and economic importance. Street activities around shops area such as daily greengrocer market, weekly night market and community events that priorities local need (Ja'afar, et al., 2012; Lee, et al., 2013) and plays a major role in the public realm. The daily street activities are essential practice to form community conscience, which stimulates cultural identity and economical advancements in the area (Day, 2004). However, the sense of community would not be sustained without strong physical evidence in urban fabrics (Ujang, 2012). Contemporary shop houses are lacking in the physical attribution towards local cultures and community uniqueness (Said, et al., 2013, p. 422). Researchers (Samadi & Mohd., Yunus,



2012; Said, et al., 2013) have suggested that modernisation development should preserve the cultural images to maintain the consistency of urban character.

### **3. METHODOLOGY**

This research is employing qualitative content analysis (QCA) in demystifying shop houses changes in physical design with socio-environmental influences. Similar researches were conducted in researching particular theme from documents as shown in Beharrell (1993) and Airken (1998) study (Bryman, 2008, p. 557). The significant of QCA is to produce wider and in-depth meaning from textual data by interpretation and relating it to the conducted research. This research would adapt relational analysis to explore and critically examine the relationship (Williamson, et al., 2003) of green building performances, socio-cultural aspect and shop physical design. Similar research was conducted onto shop houses in Singapore (Tut, 2011). In this research, source of data would draw up from three significant building standards, which are Malaysia Uniform Building By-law (UBBL), Green Building Index (GBI) and Penang's Special Area Plan (SAP).

UBBL is Malaysia building regulation law that administer all building construction standards in the country. Their minimum requirements would be generalised in this research as fundamental criteria for building construction. On the other hand, GBI is a non-compulsory rating system in Malaysia that is tailored to suit the country's climate (Tan, 2009). GBI would be the yardstick for both types of shop houses in green performances. Lastly, SAP is a draft regulation in Penang for protection of heritage buildings. SAP allows this research to identify details of construction methods, material and structure of vernacular shop houses. The identified criteria would be expanded and analysed. Therefore, through the three manual of regulations, authors would narrate keywords pending to physical regulatory and environmental input such as ventilation requirements, indoor comfort and greenery obligation. The cultural aspect would draw up from SAP by general coding keyword and requirement such as original materials, cultural words and shop houses. The coding of the three manuals would identify significant set of criteria of the Malaysian regulation standards that correlates to agencies commitment towards building performance and green design.

### **4. RESULTS**

UBBL is drafted as preliminary law to regulate the built environment industry that draws up by architect's council in 1984 (Ministry of Housing and Local Government Malaysia, 2012). UBBL was drafted based on local buildings by law and British building regulation to unify the standards in building construction. Many of these standards in UBBL are following either local Standard Specification (LSS) or American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) regulation to provide optimal quality in building construction and internal comfort.

On the other hand, SAP drafted by GTWHI complies with UNESCO requirements in conserving the world heritage town (AJM Planning and Urban Design Group, 2011). SAP claimed to be championing the improvement in quality of life, derived from economy progression and developing sustainable and conserving heritage city (2011, pp. 6-1). The dynamic vision of SAP is fundamental notion that portray positivity that could be adopted in this proposed green framework. Thus, analysis of SAP would identify on how local cultural sensitive design incorporates into contemporary practices. In addition, SAP is in line with other building regulations and laws, which includes UBBL to avoid legal contradiction. SAP depends on UBBL to provide building standards such as fire regulation, building height and ventilation requirement.

Lastly, GBI Non-Residential New Construction (NRNC) guideline released in 2009 is used as reference towards green performances. NRNC is derived from 51 requirements under six criteria; energy efficiency, sustainable site planning and management (SM), water efficiency, material and resources, indoor environment quality and innovation. In addition, Township guideline Version 1.01 is used to identify the cultural and green significance within urban context. Township guideline has 45 requirements that encompassed climate, energy and water, environment and ecology, community planning and design, transportation and connectivity, building and resources, and business and innovation. GBI Township is strongly focused on social and economic value with promoting the drive force for local business, amenities and housing facilities. Hence, Township guidelines would correlate the socio-economic aspects with local environment to produce green urban development.

**Table 1: Cross Case Analysis of UBBL, SAP and GBI requirements**

Criteria	UBBL	SAP	GBI	Remarks
<b>Physical Design</b>				
Building Physical constraints	Building depth and width is not specifically mentioned but building width shall not fall less than 20 feet (ft.) according to Concannon 1951 ruling	N/A	N/A	Typical vernacular shop houses have 13-20 ft. (width) and depth expand from 30-60 ft.
Building Height (ht.)	Section 44 (3): Shop house ht. shall not be less than 10 ft. for ground floor and 8.4 ft. for any upper floors. No storey restriction.	Sec. 4.4: Building ht. shall not be higher than 18 meter (m) or 5 storey ht.	N/A	Vernacular shop houses have 12-18 ft. ht. or 1-3 storey ht.
Air-well	Section 40: Minimum requirement for 2 storey requires 7 square meter (m <sup>2</sup> ), subsequently each floor is entitles to 1 m <sup>2</sup>	Sec. 6 Item 9.0: Air-well shall be maintained as part of the design with flexible roof to allow day lighting and natural ventilation	NRNC EQ8: Skylights are encouraged to promote day lighting in building design	Vernacular shop houses have 1 to 3 air-wells separating internal spaces depending on building depth with optional rear court feature
Five Foot Way (verandah-way)	Section 38: Verandah-way shall not be less than 2.25 m with 600 mm depth columns. Ramp (gradient less than 1 in 10) or staircase (minimum 150 mm riser x 275 mm treads) to level the adjoining units	Sec. 6 Item 2.2: Commercial activities shall not obstruct pedestrian use. Verandah-way dimension shall abide to local regulation	Townscape CPD and TRC: 75% of linked pedestrian walkway shall be covered to promote pedestrian scheme	Vernacular shop houses have 5 ft. depth or less verandah-way
Accessibility	Universal Design (UD) is required for disabled accessibility. The designates section is also covered pedestrian prioritised for verandah-way	Public space sharing is emphasised to encourage pedestrian scheme in verandah-way	Township CPD: Emphasising UD to accommodate disabled users with pedestrian network (TRC4) and open spaces	Car park facilities should expand to accommodate contemporary use
Staircase	Section 112: staircase for shop with direct access from street shall be enclosed with incombustible materials. Opening shall be provided at each landing for ventilation except building that is less than 3 storey could be unventilated	Sec. 5 Item 12: Staircase shall be built close to air-well for ventilation and abide to UBBL regulation on material use	N/A	N/A
Party Wall	Party wall shall not be less than 200 mm thickness (thk.) with masonry or in-situ concrete	Vernacular shop houses have thicker party wall (300 mm thk.) sharing between units as fire preventive measurement.	N/A	N/A
<b>Green Design and Socio-Cultural</b>				
Building Material	Section 53: All material shall abide to fire preventive and material safety endorsed by MS Standard. However, green materials are not included, assuming other regulation to be used	Material is restricted for roof and finishes (lime plaster and tiles) in preserving urban coherence.	NRNC MR: Recycled and green certified materials with regional sourcing to reduce unnecessary carbon footprint in transportation	N/A
Indoor Air Quality (IAQ)	ASHRAE and MS standards are applied to regulate IAQ through mechanical or natural ventilation. Under ASHRAE Standard 63-73: building shall provide 0.14 m <sup>3</sup> of air per minutes (cm) per occupant. Thus, any room shall have opening not less than 15% of total floor space with exception in Section 41 (mechanical ventilation)	Ventilation depends on passive design through air-vent, air-well, rear court, jack roof and facade opening design	NRNC EQ: IAQ shall abide to ASHRAE Standard 62 in regulating ventilation system to prevent harmful pollutants and mould. Natural ventilation is optional criterion provided that effective air exchange is set.	N/A
Thermal Comfort	Building that exceed 4000 m <sup>2</sup> shall require to have overall thermal transfer value (OTTV) less than 0.4 W/m <sup>2</sup> K. However, typical shop houses does not require to but must abide to ASHRAE Standard 55	Passive cooling combined with lightweight structures to reduce thermal mass and heat gain	NRNC EQ6: Accorded to ASHRAE Standard 55	Kwong et al. (2014) claimed ASHRAE Standard 55 would create unnecessary internal cooling.
Energy Efficiency	Energy efficiency shall abide to MS1525:2007 standard	Shall utilise natural lighting through air-well, opening and air-vent	NRNC EE: 35% of GBI guideline encompassing energy efficiency through exploiting available green certified lighting and lower OTTV	N/A
Socio-Cultural	Not specifically mentioned in regulation, but, UBBL has emphasis UD and public space requirement in shop houses	Shall conduct Cultural Impact Assessment (CIA) to take urban context coherent with the building including physical landscape, economy and community aspect	Township CPD: Encompassing diversity in community and mix land use by providing secure design, health and basic amenities	N/A

Urban development	N/A	Assessing the impact of cultural diversity, living heritage and townscape in CIA. Encouraging mix use in land development in promoting urban interaction	NRNC SM: Integrate community with greater compact density with promoting green transportation. Under SM3 provision to provide basic amenities in the surrounding.	Greater emphasis to car park spaces to facilitate contemporary needs either concentrated or incorporated into building space
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## 5. DISCUSSION AND RECOMMENDATION

The analysis of the studied policies has provided critical in-sight into contemporary practices. The cross examination between policies has provided fundamental knowledge into this proposed framework (Table 2). The framework comprises of 3 factors namely; Building Envelope Design (BED), Green Design (GD) and Cultural Design (CD) to determine fundamental values that should be embedded into future developments based on analytical research presented in Table 1. New technology and innovation in GD should be encouraged to enhance the building performances and fulfil the green agenda. Yet, passive design should always be prioritised to avoid ill-practises in this framework. Nonetheless, further research from public survey, climatic factor and physical simulation (Edwards & Naboni, 2013) is needed to testify the framework viability.

Green-Shop Framework		
Item	Description	Remarks
<b>Building Envelope Design (BED)</b>		
BED1: Building Physical	1) Shop house shall not build higher than 5 storey or 18 meters. 2) Shop house shall maintain higher ceiling height with minimal 12 ft. ht. to assist passive ventilation. 3) Shop house shall maintain 20 ft. or more width and more than 70ft. depth	1) Exceeding 5 storeys shop house is not supporting socio-economy with difficult accessibility. 2) Higher ceiling height allows stack ventilation and cross ventilation. 3) Deeper and wider shop house provides greater usable space with better air quality per occupant.
BED2: Façade Treatment	1) Shop house with East-West façade orientation shall have thicker wall insulation compared to North-South orientated façade.	1) Studied recorded East-West orientated buildings have greater heat gain by 20-30%, hence, required thicker wall insulation or shading devices.
BED3: Five Foot Way (Verandah-way) and Accessibility	1) Verandah-way shall not be obstructed by any means to ease pedestrian use. 2) UD shall apply to shop house design for all user accessibility. 3) Concentrated parking space or using basement as car park space could maximise land use and allow pedestrian-prioritised scheme on street level	1) Comprising SAP and UBBL guideline to provide comfortable pedestrian friendly network. 2) UD is required for disable accessibility. 3) Pedestrian scheme could enhance socio-economy with more space for community activities and engagement. While, concentrated car park space would provide safer zone for pedestrian use.
BED4: Air-well and Rear Court	1) Restricted physical space, air-well would not be suitable for contemporary shop house design. Alternative solution such as skylight or light shaft could be employed. 2) Rear court shall be maintained for hygiene and optimising back lane functionality.	1) - 2) Rear court space could be used for green space and allow greater ventilation. Back house activities could be contained within building, hence, promoting cleaner communal space.
BED5: Staircase Access	1) Enclosed staircase practice could be designed as light-well for shop's interior. 2) Staircase is encouraged to have more opening for ventilation and admitting daylight	1) As interconnect space, staircase is suitable as a daylight source for internal spaces. 2) -
<b>Green Design (GD)</b>		
GD1: Building Material	1) All building materials shall abide to fire safety use and endorsed by local standards. Green certified materials should be prioritised. 2) Materials shall not be restrict but would be encouraged to use local products with consideration of urban coherence.	1) - 2) Using local products could reduce transportation's carbon footprints. Meanwhile, building materials could disturb urban coherence with unnecessary adornment.
GD2: Energy Efficiency	1) Shop house shall be designed to maximised day lighting to reduce dependency of artificial lights. i.e. light shelf, light-well, light shaft 2) Users are encouraged to use green certified products as suggested in GBI guideline.	1) - 2) -
GD3: Passive Design	1) Shop house shall optimise passive design (i.e. orientation, insulation, ventilation) and reduce mechanical assistance whenever possible.	1) Research show local occupants have higher tolerance for regional climate. (Omar & S.F.Syed-Fadzil, 2011)

GD4: Indoor Air Quality (IAQ)	1) Passive ventilation should be prioritised through encouraging air-vent design, more opening space and jack roof design. 2) Mechanical ventilation shall not be part of alternative building design. Mechanical ventilation shall only be applicable to encourage air flow	1) Studied recorded passive ventilation is sufficient to provide effective ventilation in shop house building. (Omar & S.F.Syed-Fadzil, 2011) 2) Mechanical ventilation could be adopted to remove pollutants. Mechanical fan and attic fan could be adopted to encourage stack ventilation or cross ventilation in the building
GD5: Thermal Comfort	1) Thicker insulation for wall and roofing to reduce heat gain. Shading devices (i.e overhang, louvres) should be employed. Shop house shall refrain from using tinted window 2) Shop house shall have greater thermal mass to reduce u-value on strategic part of the building (i.e East-West orientated wall/facade)	1) Thermal resistance shall increase to lower internal temperature, while, reducing solar heat gain with strategic employment of shading devices. 2) Shop house shall meet 0.4 W/m <sup>2</sup> K (u-value) requirements regardless of building size.
GD6: Technology and Innovation	1) Green high technology and innovation are encouraged in accordance to advancing society. 2) New technology application shall adhere to local green standards.	1) High technology shall not replace or supersede passive design whenever possible. 2) Technology adoption shall be thoroughly studied before application to avoid ill practices.
<b>Cultural Design (CD)</b>		
CD1: Cultural and Community	1) Developer shall conduct post-occupancy evaluation (POE) to understand regional (local) communities in Malaysia. 2) Shop house design shall be inspired by local design to reflect the rich cultural differences	1) POE could empower architects engagement with end-users to understand local community's culture, place attachment and reduce unnecessary features or adornment 2) Place identity is important for new development in searching of sense of belonging and attachment.
CD2: Socio-Economy	1) Shop house development shall assess economy value to provide basic amenities for residential area	1) Basic amenities and local working opportunity shall undergo studies to reduce unnecessary shop house development at mature neighbourhood
CD3: Urban Context and Identity	1) Mix land use development shall be maintained and integrated with local communities. 2) Shop house development shall consider all basic facilities to attract local community engagement	1) - 2) -

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